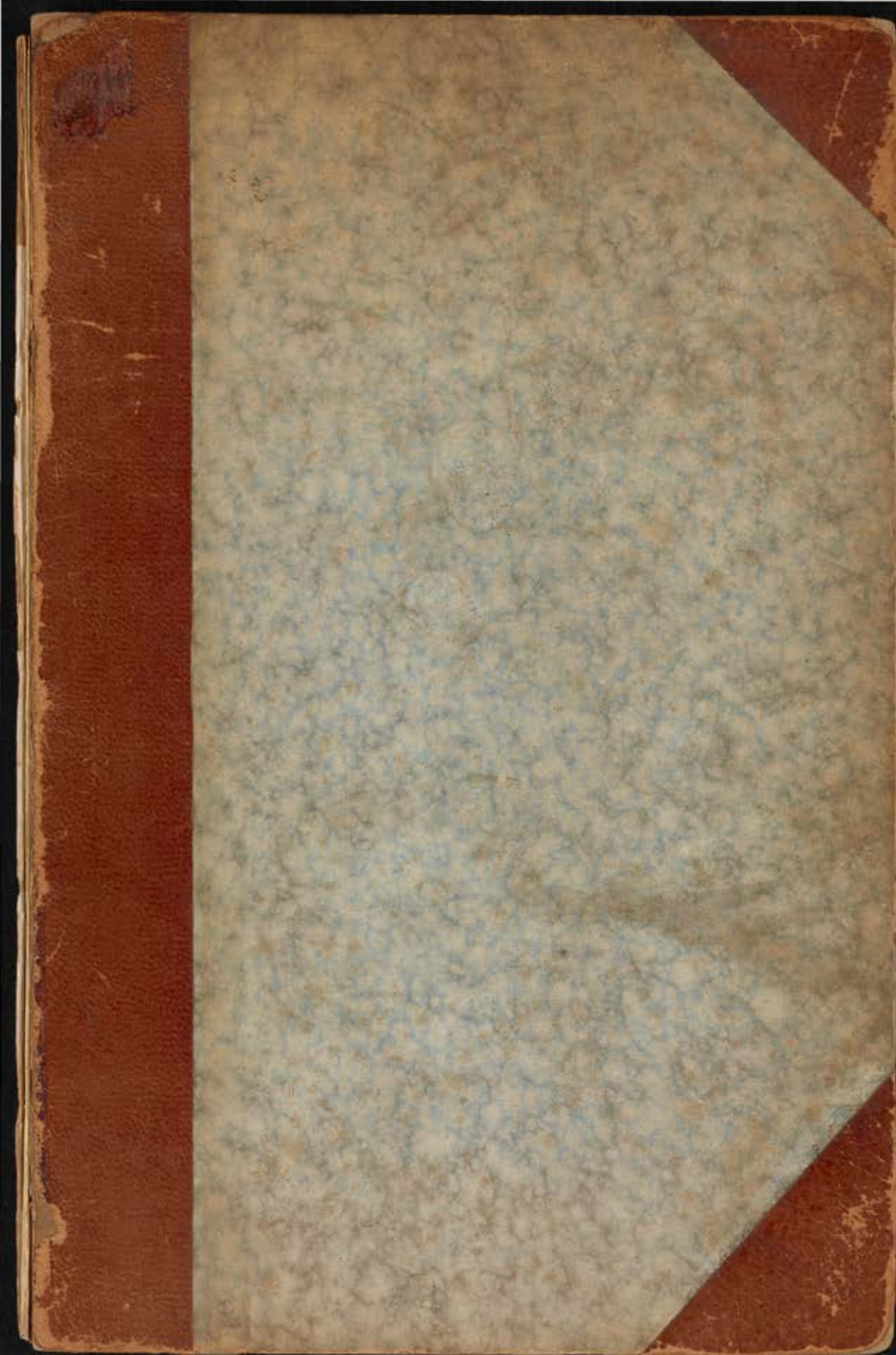


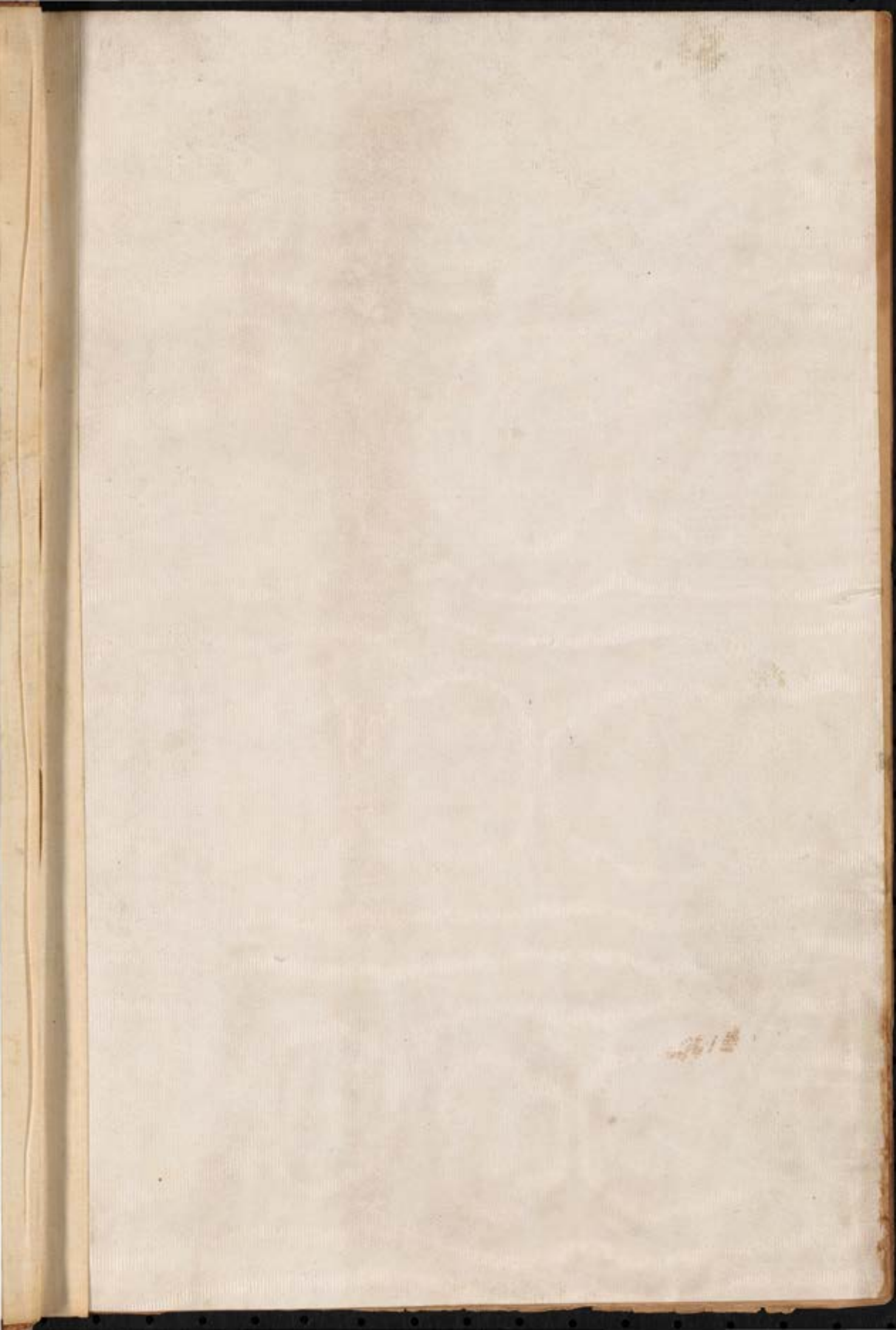
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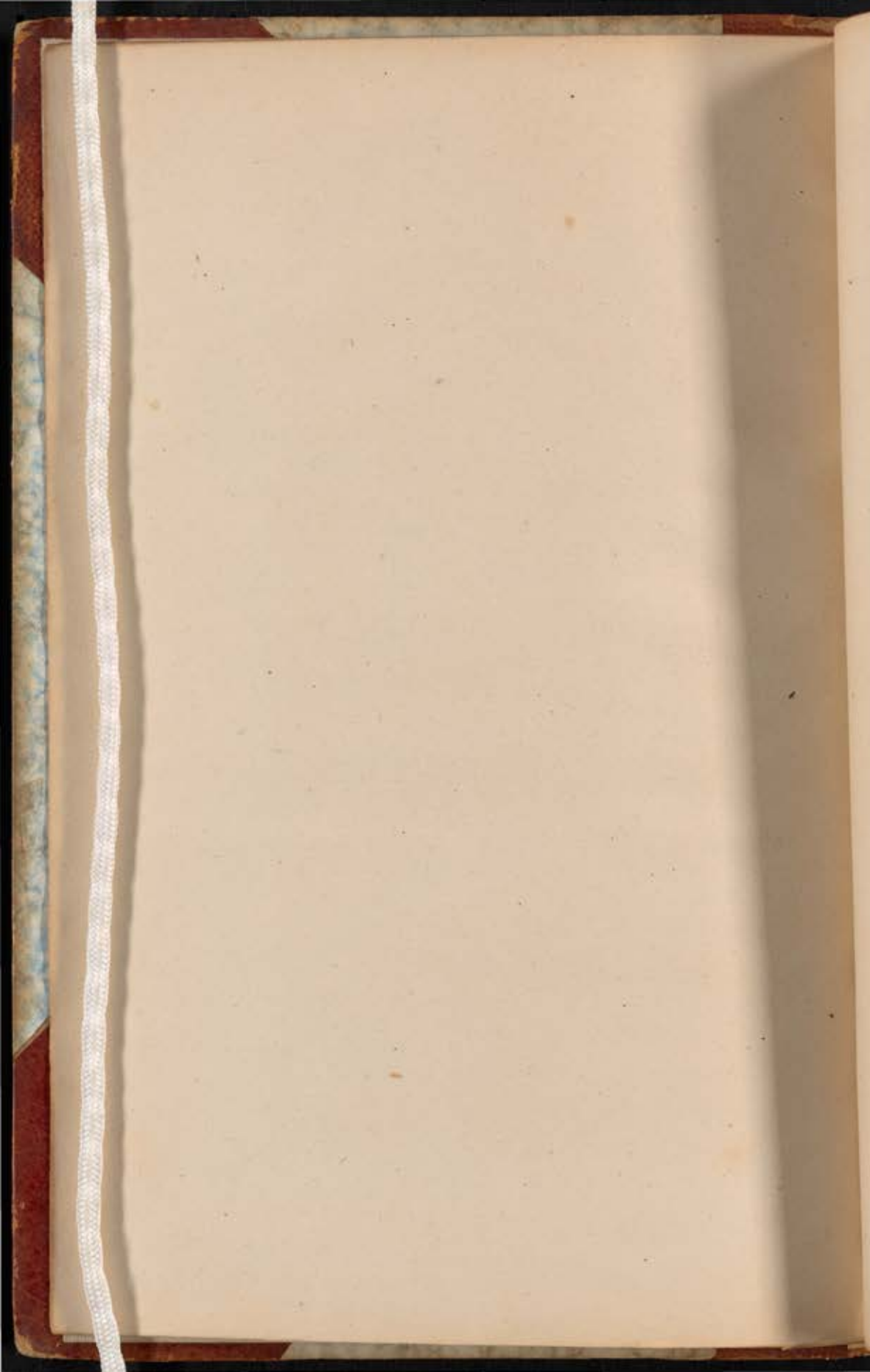


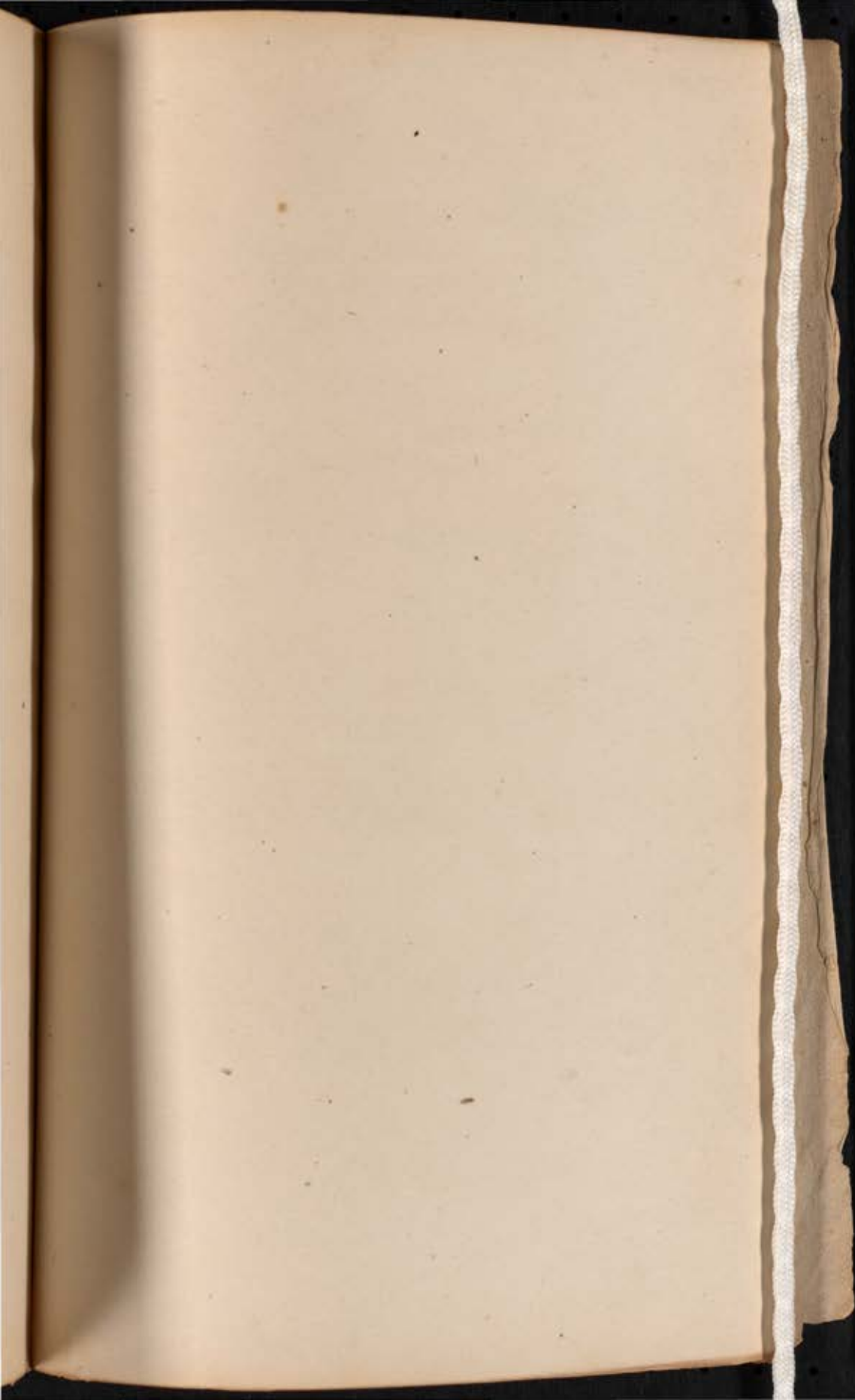














SB228

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1816

OBSERVATIONS

ON THE

METHOD OF PLANTING AND CULTIVATING

THE

SUGAR-CANE

IN

GEORGIA AND SOUTH-CAROLINA,

TOGETHER WITH THE

PROCESS OF BOILING AND GRANULATING;

AND A

*Description of the fixtures requisite for Grinding and Boiling;*

IN A LETTER FROM

THOMAS SPALDING, Esq.

TO

*Major General Thomas Pinckney,*

WITH AN APPENDIX.

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CHARLESTON, S. C.

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1816.

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Published by order of the Agricultural Society of  
South-Carolina.

JOHN CHAMPNEYS, *President.*

*May 17, 1816.*

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Charleston, 22d, April, 1816.

Dear Sir,

The success which has attended the endeavours lately made to establish the Sugar-cane in Georgia, affording some hope that the advantages of this acquisition might be extended to this State; and having learned that the state of Georgia was principally indebted for this valuable addition to her staple commodities to the intelligence and persevering exertions of Mr. Thomas Spalding of Sappelo-Island, whose patriotic spirit and liberality of sentiment I had previously experienced in a public line, I took the liberty of requesting the favour of him to communicate the result of his experience in the cultivation and manufacture of Sugar. The effect of his friendly compliance is the letter which I have now the pleasure of transmitting to you for the information of the Society, who I trust will consider it of sufficient importance to the Agriculture of this Country to direct its immediate publication. I am aware that instructions on this subject are to be found in various accessible publications, but I do not think that any can be so useful or satisfactory to our fellow-citizens as the result of experiments made in our own soil and climate.

I also take the liberty, Sir, of submitting through you, to the society an account of the culture and manufacture of Sugar in old Spain, extracted from Valcarcel, a Spanish writer on agriculture, of high reputation. My reasons for troubling the Society with this extract are, that not having met in the United States with any copy of this work except my own, I do not think that it is

*generally known here; and the similarity of climate of the districts in Spain wherein Sugar is cultivated, to that of South-Carolina and Georgia, induces me to think that this account will convey more useful information than details of its culture in situations where ice and frosts are unknown.*

*Unwilling to rely on my own imperfect knowledge of the Spanish language, I am indebted for this translation to our countryman Mr. Poinsett, whose general information and long residence as a public character in the Spanish dominions insure the accuracy of the version.*

*I Remain, very Respectfully, Dear Sir,*

*Your Faithful and Obt. Servt.*

THOMAS PINCKNEY.

JOHN CHAMPNEYS, Esq. President of the  
*Agricultural Society, South-Carolina.*



*Sapelo Island, Near Darian.*

*Dear Sir,*

I HAVE postponed so long writing to you on the subject of Sugar Planting, that I feel something of that reluctance, which arises from a long neglected duty, in now beginning this Letter: And yet my delay has arisen from an anxiety to procure correct information as to the amount of Sugar per Acre, made, on Major Butler's Plantation; my own Crop, having been so much reduced by the dry season of last summer, as to present a very unfavorable result, and a very uninviting one to a beginner in Sugar. Resting rather upon your indulgence than this apology for my delay, I will proceed to state what appears to me alone necessary to be known, in regard to the Sugar-cane of this quarter; and which the experience of *now ten years*, has furnished me an opportunity of acquiring.

It was in the year eighteen hundred and six, that Mr. Couper of St. Simons, knowing my desire to make an experiment on the Sugar-cane, sent me a few that had been growing in his garden. From these plants, I the next year cultivated in the field an acre and a half; and from this, increased my quantity as fast as the difficulty of preserving them in the Winter would allow me.

For some years this difficulty appeared almost insurmountable. If they were housed, or covered with earth, the heat often injured them;—If they were left to stand too long, or only stacked in the open field the cold destroyed them; and the injury from the one or other cause depended upon the nature of the season whether it was a wet or a dry one, and whether it was a moderate or a severe winter. To injuries arising out of these causes, we shall always in some measure be subject, in spite of all the know-



ledge that experience may acquire:—For it is the commencement of the operation of that insensible, though universal line, which limits the production of certain plants to certain climates. The judgment and experience of man may extend *for a little*, but cannot extend *this line very far*. I consider these observations not unnecessary; for in every new undertaking, we are alarmed at accidents, without recollecting, that all men are subject to them, particularly so in new enterprizes.

Three years ago, for the first time, I planted my Sugar-cane in the Fall, beginning the 20th of October, and continuing to plant as fast as possible, until I finished my Crop. As I did not lose one plant in a thousand, this period was determined on in the public opinion, as well as in my own, to be the best; and is the only time of planting in which you are certain, of preserving your Cane. All difficulties, as to preserving Cane Plants, would end here, if it were not that where it is cultivated as a crop, it will be impossible to plant more than a portion of your Cane, before you have to employ all your people in Manufacturing, and preparing your Sugar for Market. We have then to seek some other means of preserving at least, a portion of our Cane Seed for Winter and Spring planting. And the means I should recommend, are these:—To make a long *stack* fourteen feet wide, and as high as the cane will make it, say five feet, with the butts down; beginning with a log, or a bed of earth, to lay your plants upon;—these stacks, preserved for planting, to be made in the centre of each acre and sufficient to plant the acre. When the stack is finished, I would throw first some of the cane blades to the side, and then earth, nearly up to the top. After the stack has stood some time in this way, and the 20th of December approaches, (which often comes fraught with cold,) I would recommend a few old hands being employed to throw a little earth



over the stacks of Cane, two or three inches thick. The reason for not doing this at an earlier period, is, that before then there is no great danger from severe frost; and by which time the cane blades in stack have been well wilted, and there will consequently be less risk of generating a degree of heat, which would make the plants sprout and grow in the stacks; than which, nothing is more injurious to the cane seed. It will be understood that the cane stacks are broad and thin: This mode is borrowed from Louisiana, where they are called *Matrasses*; which from their flat form, is a more appropriate name. Whatever quantity of cane is required for seed (and it will take one acre to plant twenty) should either be planted or secured as directed, in the course of the month of October; for the most sensible of frost is the bud; and the same degree of cold which ruins the buds or eyes, even ripens and sweetens the body of the Cane.

Having gotten through the very important point of preserving the Cane Seed; I will proceed to state what in my opinion is necessary to the growing and cultivation of the Cane. For many years I was myself convinced that our best description of *Hammock Land*, within ten or fifteen miles of the Sea, would be found the most to be relied upon for Sugar; and that after this the *River Swamp*, as being shielded and protected, in some degree, by the water that surrounds them, as well as by an innate warmth which exists in those alluvion soils, from the quantity of undecayed vegetable matter which they contain. The drought of last Summer has, in some degree, shaken this preference; and if we are liable to a recurrence, we should transpose the order of preference. But it is still, only upon these two descriptions of land, I would think of cultivating Sugar-cane as a crop. In the *West-Indies* they make, by a very laborious process, deep trenches at four feet



apart: and at three feet distance in the range of these trenches, put four or five Cane plants, not less than ten inches lower than the general surface, though the Plants are only covered with one or two inches of soil, drawn down from the ridges, which making the trenches have produced. Making these trenches is very laborious, and however they may suit the soil and climate of the West-Indies, are not at all adapted to the soil and climate of this Country; for we have few soils that admit of sinking so deeply into them, without meeting with something dead and inert in vegetation. Add to which, the plants by being so low, do not feel the early warmth of Spring, and are kept back from shooting; and many of them, from causes to me inexplicable, perish in the ground. This I experienced in the Spring of Eighteen Hundred and Thirteen, having been induced to try the West-India manner of preparing my Cane Lands, by the advice of some gentlemen from that quarter. This failure induced me to try the directly opposite mode of making the next season, low ridges at the usual distance of five feet apart, flat at top, and about four or five inches raised above the general surface of the Land. A trench is opened in the centre of this ridge, and the Cane Plants cut into lengths of about two feet each, are placed in the trenches, so that they touch each other and make a complete line of cane seed:—They are then covered with about two inches of soil; and this depth of covering is all-sufficient, to preserve them from any degree of cold existing on the sea coast of Georgia or Carolina. In this mode of planting I am now universally followed; and there is no difference of opinion on the subject. The motive for cutting the cane plants into lengths of two feet, is to lay them more conveniently in the trench, keeping the alternate eyes, on the side, so as to come up through the Earth more easily.—In Louisiana they



plant their Cane in some instances so near, as to have their trenches at two feet apart, and making the plants touch, as directed in our mode; but this has been found in Georgia to dwarf the cane, without one useful end; for cane so planted will not sucker and the parent plant is generally the worst in a hill of cane. I have therefore mentioned this mode of planting only to express my disapprobation of it—The cane planted as I have directed, and in the months of October, November, or February (for we shall generally be engaged in November, December, and January, with manufacturing our Sugar) will begin to come up about the first of March, but not all before the last of April. It should be, when young, most carefully weeded; and as the Summer advances, the land should be dug as deep as possible between the rows, for I know no plant that delights so much in a loose and penetrable mould, nor is it to be wondered at, for the roots present a complete nett work over the whole surface. From this cause, I have found potatoes the best possible preparation for Sugar-cane. As the cane grows, it requires to be worked in the same manner and about as often as cotton; so much so, that for three years last past, my Overseer has given each year eight hoeings to my cane as well as to my cotton; and the Negroes go over the same quantity of land precisely. The limits to be put then to the culture of Sugar, does not arise in this country from the difficulty of either planting or attending it, but arises from the limited period which we have for manufacturing the Sugar:—and here indeed we are confined within narrow bounds.

For the purpose of saving labour as much as possible, and saving time which is still more necessary, our fields, if the lands are high, should have roads through them, at four tasks distance from each other, that ox carts, drawn by two or four oxen each, may approach as near as possible to the people who are



cutting and preparing Cane for the *Mill*. If the fields are clear of logs, and are not divided by ditches, the carts may approach still nearer the cutters.

If cane is cultivated in swamps, the fields must be divided as much as possible by Navigable Canals for bringing up the cane to the *Mill*; for if the cane has to be carried more than two tasks to a punt, batteau, or flat, by the negroes, the labor will be found beyond measure distressing. In order to impress the truth of this upon your mind I will point to facts. The year before last I left thirty acres of my cane uncut in the fields, for the want of additional carts; which want I could not supply for fear of the British Barges which endangered the Inland Navigation to such a degree, as to make every boat that ventured upon the water liable to capture. The present crop at Major Butler's Plantation, although there was a good Canal, in every square, (and to my own knowledge the cane was never brought above five tasks to the flats) sixty hands were employed in cutting, loading, and emptying these flats for the Manufacturing of three thousand weight of Sugar per day. There were generally even more than this number employed, and the result was not at all times equal to this; and it was the want of a supply of cane for the *Mill* that the result was not greater. For a good *Mill* should grind, if kept at work night and day, (which it ought to be) and one good set of boilers, should be able to reduce into Sugar, at least five thousand gallons of juice, making upon the average four thousand weight of Sugar.

In a flat country like this, we are compelled to raise our *Mill-Houses* higher than they do in the West-Indies, where they have often little else to do than to place their *Mill-House* on the side of a hill, which gives elevation enough to the *Mill* to allow the juice from the bed, which is covered with sheet-lead, and receives it as the *Mill* expresses it, to run by means



of a gutter, covered also with sheet-lead, into a clarifyer, containing three hundred gallons, which stands in the boiling-house. The boiling-house is placed as near as possible to the Mill-house, as well to save the trouble and expense of a lengthy gutter, as to prevent the risk of the cane-juice souring by passing far, before it is cleared of its impurities by the operation of lime upon it. In the clarifyer, from a pint to a quart of good lime is applied to each hundred gallons of juice. The quantity of lime depends upon the ripeness of the cane, and the facility with which it parts with its mucilaginous matter. Experiment must determine the quantity, and the smallest possible quantity, which will leave the juice after half an hour's settling, of a clear amber colour, a little inclined to green, is to be fixed upon. The mucilage of the cane being precipitated by the lime to the bottom of the clarifyer, the clear juice is then drawn off, by means of spiles an inch or two above the bottom, and runs into your largest or grand copper, by means of a short gutter; so, that as it is necessary, your Mill should be high enough to run your juice into your clarifyer, so also it is necessary, that your clarifyer should be high enough to run the purified juice into your boilers by means of the gutters. These observations are necessary for the understanding the description of the Mill-house and Mill which follows.

The mill-house that I have erected, is forty-one feet in diameter, of tabby, and octagonal in its form. In Louisiana, they are generally of wood, and square, and this is the form of Major Butler's. The danger of fire, the superior durability, and the better appearance of the buildings, should make us prefer either tabby or brick. The outer walls of this building are sixteen feet high. Upon these walls run a well connected plate, and over it is erected an octagonal roof, meeting in a point. Within about seven feet distance from the outer wall, is a circular inner



wall, which rises ten feet; and from this wall to the outer one is a strong joint work, which is covered with two-inch Planks for a *Tread* for the Mules, Horses, or Oxen, that work the Mill. The Plate No. 1, will show the Ground Plan of this building: And Plate No. 2, a representation of the outer and inner walls, with the platform for the Horses, which connects them, but without shewing the roof or the full elevation of the outer wall. It will be understood too, that there are two several doors, at opposite sides of the Mill-House in the lower story; the one for bringing cane to the Mill, and the other for carrying out the expressed cane; and these doors are six feet wide. There is also a door in the upper story, with an inclined plane leading to it, to carry up the Mules, Horses, or Oxen that work the Mill. Plate No. 3, is the very drawing of a Mill which I procured from Louisiana, and which served to direct me in the erection of my own Mill. I only enlarged the middle roller to thirty inches in order to increase the velocity of my *Mill*, and to admit of my mules walking. This change has been greatly approved of. In the West-Indies the mill-rollers are are smaller, and the circle in which the cattle move, so great, that to keep up the same degree of velocity in the Mill, they are obliged to canter the mules. This of itself (as it is continued four hours at a time) is enough to destroy the animals. Whether this practice is the result of an ancient prejudice, or has grown out of the greater hardness of the cane of the West-Indies, I know not; though it is probable, that both causes have had its effect in keeping up, what upon every principle of reason, as well as from my very limited experience, I think a bad one.

The Mill as represented, is raised within the circular wall, on a strong foundation of masonry, eight feet high, so as to be within two feet of a level with the Horse-way; and this may be seen by reference



to the Plate. The cost of this building, will of course depend upon the cost of the materials and labour where it is erected, but cannot be very great any where. The cost of the Mill should be nearly as follows:

*For wrought-Iron gudgeons*, to weigh from five to six hundred pounds, with steel-points and inks for them to run in; with smaller gudgeons for the main-roller, say - - - \$150

One, two feet and a half in diameter—Two, two feet in diameter and thirty inches long, each with three wheels, and iron wedges for securing the cases, would cost in New-York about 600

*The wooden work of the Mill*, with plantation assistance *found*, should not cost more than 100

---

\$850

Three cases and wheels, were charged to me, at M'Queen's Foundary, at  $8\frac{1}{2}$  cents per pound.

From what I have seen of Mr. Johnson's Work in Charleston, and from what I have heard of Mr. Johnson himself, I regretted much that I had not got my work done there. The cases, in order to increase the weight, are made unnecessarily thick by founders: Mine are two inches thick at the end, and two and a half in the centre. This swell in the centre, is made for the purpose of wedging the wood at the two ends, and thus preventing the rollers either sinking or rising upon the gudgeons.

I see no reason however, why the cases, if of *good metal*, should be more than one inch thick at the end, and one and a half in the centre. It will be understood, that the turning of the cases was a separate charge of thirty dollars each, but is included in the amount stated.

I must again recommend Mr. Johnson's Foundary, as it is of great importance, in case of accidents, to



have the remedy at hand, and not at a distance. The Mill described will give, with great ease three hundred gallons an hour: Mine has given three hundred and sixty by a watch.

Plate No. 4, is the last Iron Mill, imported by Major Butler. It is a beautiful Machine, and works well; but the objection to it is, that the Rollers are too small. To get over this, Major Butler's Agent has geared it, and made the oxen work below. Whether it is the gearing, or the distance the oxen are placed from the point of resistance, (and this I believe to be the case) it goes extremely heavy, taking six yoke of oxen to do little more than four mules do in Mills of the common construction. The cost of this Mill, in England, was - - - - - £ 315  
Importing charges, fifty per centum, 157 10  
Duty, about - - - - - 105

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£ 557 10

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Or some where about two thousand five hundred dollars. To a man indifferent to expense, this Mill, with rollers of an increased size, might be desirable; or he might order the three rollers without the frame works, which would cost in England, from one hundred to one hundred and twenty guineas; which at the common charges of importation, would make the cost but little more than a wooden mill with Iron cases. These mills, however, have never made their way into Jamaica, except in one or two instances, and were then attached to Steam Engines. The cause I suppose, (a well grounded objection) from the difficulty of repairing or correcting any injury. This, Sir, is all that I need say of the Sugar-Mill. To be able to execute it, the workman must see it, for although the most simple Machine in all its parts, that I know of, great strength is its character; and so essential a property of it that nothing but personal ob-



servation can sufficiently impress this truth—the first Mill I built, one of the gudgeons broke in the first hour's work.

The boiling-house which, as stated before, is placed as near as possible to the mill-house, with a gutter leading *through* the walls of the mill-house, conveys the cane-juice, as fast as it runs from the mill-bed into the receiver of three hundred gallons standing at the end of the boiling-house. Whenever the receiver is full, which should be in an hour, the lime is put into it, at the rate, as before directed, of from one pint to one quart to the hundred gallons. In the mean time, the juice is discharged into a second receiver which stands beside the first, and is of the same form and contents. While the first receiver is precipitating its mucilaginous matter, and is purifying itself, to be passed into the boilers, the second is filling and preparing to undergo the same process. When all the boilers are full, and *not before*, the fire is kindled under the smallest, and is communicated through the medium of arches from one to the other, until it passes the last boiler, and enters the chimney which is placed without the house.

A set of boilers consists of either four or five; generally however four; and for a crop of one hundred acres of cane, should contain: No. 1, three hundred and twenty gallons,—No. 2, three hundred gallons,—No. 3, two hundred gallons,—No. 4, one hundred gallons. The form I approve of, is a semispheroid, with the bottom a little compressed. And for common dimensions, without a strict regard to quantity, I would recommend No. 1, diameter, 62 inches, depth, 30 inches, No. 2, diameter, 60 inches, depth 28 inches; No. 3, diameter, 52 inches, depth, 24 inches, No. 4, diameter, 42 inches, depth, 22 inches.

A set of coppers of three dimensions, importing the copper, and having them made in Savannah or



Charleston, would cost about five hundred and fifty dollars. I have a set made in Savannah which has cost me that sum; though I have given more than I ought for the making them here, rather than encounter the risk of disappointment by sending North. The order I gave for my copper, in which I was followed by several gentlemen, was for four copper bottoms--No. 1, 4 feet 6 inches--No. 2, 4 feet 6 inches--No. 3, 4 feet--No. 4, 3 feet--to weigh each, one hundred pounds; and ten sheets of copper for sides, each 40 pounds; and 75 pounds, of assorted copper rivets, making an order of 875 pounds of copper. I have given in Savannah twenty cents for the manufactory of this copper. It is a high price--fifteen would have been enough: It would be done in New-York for ten. I have added to my boilers a rim of thin copper, at an angle of forty-five degrees, to keep it from boiling over. Lead is used for this purpose in the West-Indies, but it burns away so soon as to cost more than copper. In Louisiana, they depend generally upon wood or brick, a bad plan, but not easily remedied, as they use Iron Boilers; and you cannot attach either copper or lead to iron without a very expensive process. The cost of these brims, attached to the four boilers, is about one hundred dollars, making the whole amount six hundred and fifty-dollars: And a set of boilers, of these dimensions (worked night and day) should produce four thousand weight of Sugar every twenty-four hours. These boilers are built into a solid mass of brick-work on one side of the boiling-house. The fire being lead from the smallest boilers, under *which* it burns, upon grating-bars, which admit the ashes to fall into the ash-pit below. The heat is so kept in by the Mason-Work, that the second and third boilers boil as furiously as the first, and so would the fourth but for the frequent supply of cold juice which is drawn from the receiver into it.



Opposite to the Boilers, on the side and end of the house, are ranged eight Coolers, made of cypress two inch plank, of an oblong form, and ten inches deep, which contain a tierce of Sugar each. These coolers receive the syrup out of the track or smallest boiler, and in them it granulates as it cools.

For the operation of boiling or reducing the cane juice into sugar, I feel that no precept can be of any use. No rule has yet ever been found to regulate the time of boiling, as it depends upon the quality or ripeness of the cane. Bryan Higgins, a great Chymist, has improved the Furnace, and mended the form of the boilers, but he has not been able to give a standard, by which to determine the point at which syrup would granulate. If such a standard existed as to cold syrup, it could not be applied to a fluid heated to the highest possible degree. He left this part of the process where he found it, in the hands of the negroes, and in better hands it could not be placed. As the observations of negroes are limited to a few subjects, their perceptions become clearer and more distinct. For nature has kindly ordered it, that our faculties should be improved in proportion as they are exercised. Few white men, therefore, from the West-Indies, know any thing about Sugar-boiling; but by a few days experimenting upon a small parcel, ourselves, and our overseers, and negroes, acquire all that is necessary to be known.

The greatest enemy we have to guard against at first is our boiling. If we strike (which is the term used for taking off the syrup from the boiler) as soon as it looks thick, and its great bubbles have subsided into small ones, which form round the sides of the boiler about the size of a bead, with something of an oily appearance;—If the syrup when cold, becomes too thin and will not granulate; at the next attempt, increase a little the period which is allowed between



this subsidement of ebullition and the striking of the syrup. In one or two attempts you will not fail to find the point at which it will granulate; and you may in future depend upon the eye of your negroes measuring distinctly that point; provided your Mill, your Gutters, your Clarifiers, your Kettles, and your Skimmers are kept washed, scoured, and scalded: for no Mahometan, with his seven daily Ablutions, is a greater enemy to dirt than sugar is. I am prolix and pointed in this direction; and I intend to be so, for all the failures I have ever known in my neighbourhood, have arisen from a neglect of cleanliness. And when we reflect that copper and lead are the instruments we are employing, we should rather rejoice than repine at the unwearied attention to cleanliness which this operation requires.

To elucidate by example the facility of acquiring a knowledge of sugar making, it is only necessary to state, that this year Mr. M'Queen of Savannah had with him a man from the West-Indies who had been an overseer there. He was making bad sugar, and but little of it, when I brought him one of his black men, who had been but one week in my boiling-house, and he improved both the quality and the quantity of the sugar. From the boiling-house, the sugar then a thick turbid mass, combined with its molasses, is conveyed into the curing-house by tubs. The curing-house is united to the boiling-house, and makes with it the form of an L or T Plate No. 5. In the curing-house, strong joists cross from side to side, at fifteen inches apart, resting at the end upon an abutment wall. The bottom of the house, is two inclined planes, of two feet descent, that discharges the molasses into a gutter in the middle. This gutter also inclines a little to one end, where it empties itself into a close cistern containing two thousand gallons.—The cistern may be made of cypress plank, rammed at the bottom and sides with



clay. For preserving the molasses clear, the cistern should be covered over with plank, and have only a scuttle to take the molasses out. For the convenience of moving your casks, there should be a planked tread-way over the joists from one end to the other.

The boiling-house should be lighted by many windows: and the whole length of the roof, should have rising from its top, a latticed Cupola, to allow the steam to pass freely off. The steam rises in such volumes, as greatly to impede and effect every operation in the boiling-house, consequently we should ventilate and light it well. Directly the reverse should be observed of the curing-house. The greatest difficulty in the speedy and radical cure of the sugar, arises in our climate from the cold, which thickens and coagulates the molasses before it is discharged from the sugar. To prevent this, we should Pot or Barrel the sugar from the coolers as soon as possible and while it is yet warm; and have our curing-houses lighted with a very few windows. If convenient, a terrace roof should be preferred, which keeps in the heat: stoves also would facilitate the sugar discharging its molasses. Without attention to these points our sugar will acquire a bad character, and it will be in vain that a few will labour to preserve, if all do not attend to it.—Nothing more occurs to me on the subject of either the apparatus or process for making sugar. Whatever else is to be learned, must be acquired by personal inspection; for the eye conveys more instruction in all the manual arts in one hour, than a volume of description.

Any Mill-Wright will be able, after seeing a sugar Mill, to make one with appendages: and any man, white or black, will be able to hang the Kettles. The whole expenditure for my sugar apparatus, or Mr. Carnochan's in my neighbourhood, (the building of which are executed neatly in Tabby) and the cop-



pers of the size given, allowing a half dollar a-day for every negro employed, is short of five thousand dollars.

For several years, from small quantities of sugar made from small portions of land, I had been lead to believe that two thousand weight of Sugar per acre might be expected. In the year 1814, I had from about eighty acres, one hundred and fifteen tierces, under the disadvantage of having a broken boiler which lost me a great deal of cane-juice. This product rather confirmed my previous impressions; but the year 1815 has greatly disappointed my expectations. I had growing of plant cane, one hundred and four acres; and of ratoon cane, about eighty acres. The drought was so great that there was not from this hundred and eighty acres above one hundred and twenty that could be cut for the Mill, and a great deal of that was not two feet long: the result was eighty two tierces or about sixty thousand weight of sugar, being five hundred weight to the acre. This was upon hammock land, which every year before the last had brought cane of five feet length for the Mill. Major Butler, (this being the first year that he has cultivated sugar as a crop) had at his river swamp plantation one hundred and ten acres of cane growing; ten acres of which was put up for seed, besides the dwarf cane not fit for the Mill from the rest of the field. The result has been one hundred and forty tierces of sugar, supposed to be one hundred and forty thousand pounds, or about fourteen hundred pounds per acre. Even this result has not equalled my expectations; for it will be difficult to find or difficult to grow a more beautiful field of cane in this country than that of Major Butler's; particularly that part of it which grew upon the interior squares of the field, and which has a great portion of undecayed vegetable matter upon its surface. The clay lands near the banks of the river, after the vege-



table mould has been worked off by a few years of cultivation, produce very indifferent cane. The superiority of the mossey lands over the clay lands of the river, did not greatly surprise me; for Lord Dondonald in his treatise upon Chymistry as applied to agriculture, recommends peat as manure for cane; but he does, what nothing but a mind heated to excess would have thought of, recommends that that peat should be prepared in Scotland and sent to Jamaica for the purpose.

There has been little sugar made for sale by any other person than Major Butler and myself; and none that would give a more favorable result upon any scale than the two crops I have quoted.—In the coming year in this quarter, there will be but little increase of sugar-cane. The last Winter has been so severe that a great portion of the seed-cane has been destroyed: add to this, the prices which Rice and Cotton bring have a tendency to slacken enterprise; while the drought of the last Summer has filled men with well-founded alarm, as to the cultivating of sugar upon those lands, which if not the most productive as to quantity, have heretofore been deemed the most secure from our dread enemy *frost*. Its operation upon the sugar-cane is extraordinary, yet without it, it would in many instances be scarcely possible for us to make sugar at all. While it is moderate, it only checks the vegetation of the cane and ripens the juices and leaves them as rich (if its increase has been gradual between the period of blighting the cane, which should take place the first of November, and the freezing of the stock, which commonly takes place somewhere about the seventeenth of December) as it ever is in any climate. After that the cane begins gradually to decline in quality, until the ice becomes so severe as to burst the rind of the cane, when in a few days it loses every de-



gree of its sweetness : this has for the two last years taken place on the night of the seventh of January.

Here then we have the length of period that we are allowed in preparing our Sugar-crop for Market. That is, from the last of October to about the tenth of January. The length of period might be increased by stacking or matrassing our cane in the fields: And this I understood used to be done in Louisiana, but has been given up from the increase of labor which it produces. The cultivation of Sugar-cane will, I conceive, greatly improve the quality of our up-lands. The quantity of vegetable matter which the leaves afford, is greater than that of any plant we know of; and the decay of these leaves, if they are worked into the soil, must improve it. But what is of much more importance, as the quantity we can take off is so very limited, we shall improve in the cultivation of our fields, and be forced to adopt that great instrument of fruitfulness to soils and of wealth to a people, a *rotation* of crops. The rotation upon high-lands that I would think best is, first year cane, second year ratoon cane; the cane blades dug well into the soil early in the Spring, and as they decay dressed a little up to the roots. Third year cotton, with the cane blades dug again into the soil. Forth year potatoes, corn, pease and pumpkins—as many potatoes as possible. Fifth year, after the provision crop is taken off, and whatever manure the Plantation affords applied to the inferior parts of the land, it may then again be prepared for cane-plants. And with this series of crops I am satisfied no time will exhaust the lands. In St. Domingo, I have understood that instead of that boundless quantity of manure which is employed in Jamaica, they prepare their land for planting cane by a crop of potatoes: And respectable men have told me, that the older the fields were the more fruitful they became under the operation of this system. I would not explode manure, but



employ it in lesser quantities; and rather depend upon the effect of a series of crops than simply dosing a small portion of my field with hot manure.

In River-Swamp, a beautiful series of crops is produced by first Rice, second Cotton, third Cane, fourth Ratoon-cane, (if the Ratoon-cane answers well upon river-swamp, which is not yet fully ascertained) fifth Rice. This series would give good crops of each, for cotton delights in the firmness and adhesion of the soil it grows upon, whether the land be high or low; while at the same time, from the constant cultivation it requires, and from its shading so completely the ground, its roots pulverises and loosens it very much, and becomes upon swamp-lands an admirable preparation for Sugar-cane. Rice every fourth or fifth year would be necessary to keep the land from sinking, and provide for it in the water that nourishment which nature intended.

I must beg you to excuse the want of method that appears in this letter; for I have set down facts as they occurred to my memory; believing however that every useful circumstance that my experience has furnished me with, is distinctly stated. The result adduceable from it is not of so flattering a cast, as the extravagancies published in the papers might have lead you to expect; but of old time common fame was known to be abominably addicted to exaggeration. And I beg you to accept the assurances of my being, with great Respect,

Your Ob't. Serv't.

THOMAS SPALDING.

25th March, 1816. }  
*Sapelo Island, Darien, Georgia.* }



*N. B.*—The number of Negroes employed in making of Sugar, from the first of November, to the fifteenth of January, are very great. The smallest number for one hundred acres of land, will be found to be,

<i>Boiling-House</i> —Superintendant	1	
Skimmers	4	
Clarifiers	3	
Barrellers of Sugar	2	
	<hr/>	9
<i>Mill-House</i> —Feeders	2	
Returner of Trash	1	
Bringers of Cane	2	
Carryers of Trash	2	
	<hr/>	7
Mule-Minder,	1	
Boys to Drive	4	
Ox-Cart Men and Boys	8	
	<hr/>	13
In Field, cutting Cane		10
Bringing Cane and loading Carts		20
Preserving Cane-tops (old hands)		3
	<hr/>	62

To make this number answer, the roads through the fields must be very near, or the Canals very convenient; and the field-hands at night must spell the Boiling-house and Mill-house hands.

It will be necessary to provide for the Mill-work twenty horses, Mules or Oxen, so as that every four of them may labour four hours, leaving four hours only of absolute repose.

*Four Ox-Carts*, with brand wheels from four to six inches Tire, and twelve yoke of oxen are necessary for bringing in the Cane on high land; on Swamp-land, Canals and flats must supply their places.

T. S.



## APPENDIX.

## MODE OF CULTIVATING SUGAR IN OLD SPAIN.

*Translated from Valcarcel by Joel Poinsett, Esq.*

The Sugar-cane is a delicate plant, and thrives only in warm or temperate climates. It requires a strong rich soil, although a light soil well prepared will produce sweeter canes, and sugar of better quality, but not so abundant a crop.

The land should be prepared by ploughing and cross-ploughing, and about Christmas should be manured with dung well rotted and ploughed in. Towards the commencement of the month of March it should be again worked up with the plough.

The land being thus prepared, a straight furrow is made by a plough furnished with orejeras (*two mould boards*) so as to open the earth a span deep and eighteen inches wide at the bottom. The furrows are made three feet apart. The planting commences on the 15th or 20th of March, according to the weather. If the soil is cold, it is necessary to wait until after the frosts; but it is better to plant in all the month of March; when planted later, the crops are never so abundant.

The plants are cut in lengths of a span and a half, so as to have four or five joints; the tops having the joints closer, should be cut only one span long. A little water is let into the furrow, and the plants are set in the bottom four in a row, and about three inches apart. At a span distant from this row another is formed, and in this manner the whole furrow is planted. Some persons do not water the furrow first, but place the plants upright and stuck about three inches in the ground; two being placed against the sides of the furrow, and the other two at equal distances between them; and so continue to plant the whole



furrow, placing the rows at a span distant from each other:—They then fill the furrow with water. The cane may likewise be planted by laying it flat in the bottom of the furrow and covering it with earth—a cane will spring from every eye. The thin canes, which are not fit to make Sugar, will answer very well to plant in this manner; but the first method is generally practised.

The ground is kept moist, by watering it from time to time; and when the cane has sprouted, it must be hoed, taking great care not to touch the roots. When the cane has grown about two spans high, a *forked plough* should be passed between the furrows. About the same time rotted dung or street manure may be laid on the furrows. When the plough can no longer pass on account of the height of the canes, earth should be continually thrown up as the canes grow, so as to form a ridge eighteen inches high.

The water is let on between the ridges: To effect this, small dams are formed ten or fifteen feet apart, which contain the water and allow it to penetrate to the roots of the plant. When the water has sufficiently soaked in, a breach is made which lets it off to the next dam, and so on until the whole field is irrigated. In this manner the weeding and watering are continued until the harvest, which takes place about Christmas. Others cultivate the cane in the following manner: Twelve or fifteen days after planting, according to the weather, they water a second time; and when the canes are a span high, they weed them with the hoe, and three days after water them again. Fifteen days after this, with a small spade they make holes between the rows, and throw into each four large handfuls of rotted dung, covering it over with earth, and leaving the furrow level with the rest of the field. Four days after this operation they flow the whole field, and afterwards take care to keep it free from weeds. On the thirtieth or fortieth day



they bed the canes, forming a ridge about a span high, carefully leaving the tops of the canes above ground. They continue to water every month between the ridges until the cane is ripe, always weeding before they let on the water.

It has been observed that in rainy seasons the canes are larger and better; but if water be wanting, either from rain or by artificial irrigation, the canes are small, and the joints short with very little juice.

Every *hanecada*,\* if well cultivated, will produce ten arrobas (250 pounds) and more of good Sugar.

The Sugar-cane ripens about the middle of October, and the harvesting lasts until the latter end of December, provided the frosts do not previously destroy the cane; to prevent which, it is customary to water them before they are gathered.

As they ripen, they take a yellowish tint, and the lower leaves become dry, and should be removed. It is easy to know when they are perfectly ripe by chewing a cane, and tasting the sweetness of the juice.

They are gathered, when perfectly ripe, by bending them down to the ground, which breaks them off near the root; or they may be broken off by taking them near the root, and drawing them towards you. The roots may be left covered for the next year, as they will produce very well for two years, but not more.

The small canes are kept for planting. The good ones should be stripped of their leaves to within four or five joints of the top, which should be left with their leaves on, as they protect them from injury and preserve them better—the tops are cut off for planting the next year, and the good canes either whole or cut in two are then carried to the Mill.

The tops and small canes are made into fascines or bundles the size of a man's body, and bound to-

\* As much Land as a bushel of Wheat will sow.



gether with a rope made of grass, the points of the leaves being all placed on one side. In a corner of the field a circular hole is dug three feet deep and sufficiently large to contain all the bundles. They are placed upright, taking care that every cane touches the ground, and that the bundles are pressed close together. The earth is then thrown on so as to cover them three feet, and they are afterwards watered every month until the season for planting.

The following method is likewise pursued to preserve plants. Small bundles are made of the tops, binding tight the lower part, they are then placed on a level surface in the form of a square and pressed close to the ground. Earth is thrown up and stamped against the sides, so as to form a wall round the plants three spans thick and of the same height. The leaves of the tops are left uncovered.

Every twelve or fifteen days water is let into the small ditch, which has been made by throwing up the earth against the plants. A few pots of water should likewise be sprinkled on the leaves of the tops. The water should be poured on until the surface of the earth becomes moist, but it should not be allowed to form a pool. In this manner the plants may be preserved until March.

When the land has been well prepared and the canes are good, the roots may be left covered with earth for another year; but not for more than one year, as the canes will then degenerate and become small and dry. When the canes have been injured by the frost, it is necessary to leave the roots for the next year—the frost not generally penetrating to the roots.—

A field of old roots should not be watered or worked until they begin to sprout towards the latter end of February or the beginning of March. It is then necessary to open the beds so as to uncover the eyes, and to weed and water them as at the first planting.



At the same period of their growth, manure should be thrown into holes made in the beds, but always leaving a ridge, and following in every respect the method before laid down. The cane produced by the old root is not so lofty as that from the plant, but the juice is sweeter.

When the old roots are taken up they should be dried and burnt and the ashes used to manure the land, which for four or five succeeding years ought to be applied to raise wheat, or to some other culture, as the cane exhausts it extremely.

The Mill in which the cane is ground consists of two large cylinders shod with iron, and placed horizontally upon each other. The upper cylinder is moved by a water-wheel, and being furnished with teeth at one extremity which fit into the holes made in the lower cylinder, turn it with equal velocity. The canes are laid upon a board fixed on one side of the cylinders, exactly between them and inclining towards them. The irons of the upper cylinder draw the canes in, and after passing through the cylinders they are thrown over again by means of hooks, and are passed a second time through the grinders. The juice runs along a conduit into a cistern.

The men who feed the Mill should be cautious not to suffer their hands or clothes to be caught in the cylinders.

After the canes have been passed through the cylinders they are thrown into wooden vats well hooped with iron, and placed over a cistern to receive the juice of the second pressure. Large beams are placed lengthwise upon each other, and fastened together with ropes:—A round board the size of the vat is laid on the canes upon which this lever presses and squeezes out the last drop of juice. It is necessary to remark that the juice should be directly carried to the boilers, and no more ought to be expressed than can be worked up in the course of the



day. If left twenty-four hours it ferments and turns sour.

The boilers are placed over a furnace in a straight line and at equal distances. Four small boilers for the juice, six for the Syrup, and two for the Sugar.

The juice is put into the first boilers, and is boiled and scummed until it throws off the dregs, and the liquor remains clear. It is then taken out and passed through coarse cloths placed over earthen jars. When the liquor has been strained, it is poured whilst still hot into the next boilers, where it remains until it becomes a thick syrup. From the second boilers it is poured into jars and left twenty-four hours to cool and settle; after which it is put into the Sugar-boilers. Care must be taken to stir the liquor, taking it up with a large ladle and pouring it back again to prevent it from burning.

When sufficiently boiled, the syrup is emptied into a large pot and must be stirred until it coagulates.

The Sugar is then put into moulds made of baked earth of four or five spans high, two wide at the mouth, and a little more than one at the bottom, so as to have the form of a vase. It is better that the mould should terminate in a point, with a small hole through which the dregs or molasses may filter—before the Sugar is put into the mould the hole is stopped, and must not be opened for a week, until the Sugar becomes solid, and there is no longer any risk of its running out with the Molasses.

The mould is placed over an earthen vessel, the syrup is poured into it, and the surface of the Sugar is covered about a finger thick with clay mixed with water. The clay must be moistened from time to time, until the sugar becomes white, which may be perceived through the cracks of the clay. Where there is no clay, any light earth may be substituted, provided it be not muddy or filthy. When the Sugar



has crystalized, the hole at the apex of the mould is opened, and after the dregs have entirely drained off the clay is removed, and the Sugar taken out and placed to dry in lofty, well ventilated apartments.

## APPENDIX II.

The introduction of the Culture of the Sugar-cane will form an important era in the History of the Agriculture of the Southern States. The manufacture of Sugar in the lower country of Georgia, and in some of the maritime parts of this State, is no longer hypothetical. To encourage our Planter to attempt more generally the cultivation of the Cane, as well as to direct their experiments, we have been at some pains to collect from the most respectable sources the following information.

### *Soil.*

In Georgia, abundant crops of Cane have been produced on a variety of soils—on the highest and driest Live-Oak land of the Sea-Islands, on low land adjoining those swamps best calculated for rice, and on high Pine-Barren. Which is best seems not yet determined; but clay, and such parts as are settled in water, should be avoided. Tide lands, which have been appropriated to the culture of Rice, will serve extremely well, but they should be drained deeply, and the gates of the trunks so constructed as not to allow the fields to be overflowed; and they should be kept open that the water may flow in and out with the tide. The water in the ditches should be prevented from stagnating or growing so hot as to scald the root of the Cane.



In the vicinity of Charleston the Cane has grown best in moist ground well drained.

In dry Seasons irrigation would perhaps be highly serviceable, for in the Fall of 1815 a Sugar-cane field near Savannah was, owing to the high tides, two feet under water, and the Cane appeared to grow much better after this accidental watering.

#### *Time of Planting.*

The time of planting is from the first of November till March, the earlier in the season the better.

#### *Mode of Planting.*

The beds are made (such as would be called flat cotton beds) four or five feet apart; a trench is opened in the middle of the bed three inches deep; the cane is cut into pieces of 14 or 18 inches long, and laid horizontally two feet apart in the trench, the eyes being so placed that none of them will point downwards; the cane is then wholly covered with earth about two inches deep. One thousand canes will plant an acre of land in this manner. This is the most common mode of planting in Georgia, but it is still a question whether close planting may not be more productive: the canes might be smaller but would be more numerous. At New-Orleans they consider close planting, even so close as to resemble a Crane-brake, to be most advantageous. The quality of the soil, we presume, should determine this point. In corn lands but little preparation is requisite—where the ground is mellow it should be simply furrowed out and the cane desposited.

#### *Attendance on the Crops.*

It does not require as many hoeings in the season as cotton. About the middle of summer the leaves are stripped a little way up the stalk which assists its ripening; but the cane intended for planting should



not be disturbed as the leaves protect the plant from the cold, and prevent the eyes from being bruised in moving about.

### *Time of Cutting the Cane.*

The cane has usually been cut in Georgia from the 10th of October to the middle of November. Good sugar has been made there as early as the 9th of October, and as late as the 31st of January. Frosts were formerly considered as affording the greatest obstacle in the way of the culture of the cane; but they are now found to be advantageous. Before the frosts set in, the cane-juice granulates with difficulty, but afterwards Sugar of the finest quality is made with great facility. It has also been proved that fine sugar can be made though the juice has been frozen, and the thermometer at 10° below the freezing point.—

When the canes are cut they should be brought from the field with as much expedition as possible, and put away in such a manner as to protect them from the effects of cold, and from heating—the last is the most difficult, for covering the cane with only an inch of earth will protect it from frost. Some which fell into a ditch just after cutting last fall, were discovered in the winter perfectly fresh and in a proper state for planting. If a mode for keeping them safely could be discovered, sugar could be made more at leisure than it is at present.

### *How much may be Planted to the Hand?*

To this common inquiry we cannot give a satisfactory answer—One hand may give the necessary attention to 4 or 5 acres of canes until harvest; but the difficulty of conveying the canes to the mill when cut is so great, that it is doubtful whether one negro is competent to the management of two acres. Ripe canes are so extremely heavy



that a mode of removing them from the field with sufficient dispatch is a great desideratum.

*Produce.*

One acre of land may be calculated to produce from 20 to 30,000 Sugar-Canes; and One thousand canes of the common size grown in low land, will yield 600 gallons of raw juice, which when boiled to sugar weighs about 724 lbs. from which deduct for draining and weight of barrel 124lbs. leaves 600lbs. nett, or a pound of sugar to the gallon of juice. The return of 5000 canes is 2400lbs. nett of sugar per acre. This is an actual and fair experiment, and a sufficient incentive to extend its cultivation.

One acre of Sugar-Cane will plant twenty acres of land, which will be sufficient for the first season to teach the negroes and prepare them for the ensuing season, when the crop can be extended at pleasure.

Four thousand cane tops will plant an acre, which can be bought for twenty dollars.

*Expenses attendant on the Process of making Sugar.*

In order to give a definite idea on this head, and at the same time to exhibit a more satisfactory view of the nett proceeds of a sugar crop, we present our readers with an extract of a letter from a gentleman of great respectability and intelligence resident near Savannah:

"In Nov. 1814, I planted 18 acres of cane from the growth of one acre of the year preceding. The cane was ready for cutting about the middle of October, though I could not begin until the 15th of November.

"My sugar-making apparatus consisted of



" I.—Three Copper Kettles containing 320 gal-	
" lons made in Savannah—they cost	\$280
" II.—A mill of wood made exactly like that	
" described by Bryan Edwards, which with	
" the masonry I value at (masonry cost only	
" 45 dollars)	145
" III.—Two pole buildings with brick work	120
	<hr/>
	545
	<hr/>

" The 18 acres have produced, as nearly as I	
" can estimate the weight, 12,000lb. of good	
" sugar, at 15 cents	\$1800
" 7 Hogsheads of Syrup or 770 gallons at 75 cts.	577
" 110 gallons of Molasses at 60 cents.	66
" 60 or 70 gallons Rum at 60 cents.	60
" 59,000 canes sold for planting, at 20 dolls pr. M.	1180
	<hr/>
	Total—\$3683
	<hr/>

" It should be taken into view that a great quantity  
 " has been consumed by the negroes, for when we  
 " begin to harvest every one eats."

*Inducements to the Cultivation of the Sugar-cane.*

The cane bears those equinoctial storms to which our coast has been so much exposed better than either cotton or rice. It is a cheerful crop.—The health of the gangs of negroes employed, is much greater in this species of cultivation than in any other.—There is no vegetable that would yield the negro so many comforts as the Sugar-cane, and as a negro-crop, planters should make a trial of it.

FINIS





Plate No. I.



P. 17½ Feet.

8 feet to half an inch.

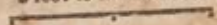
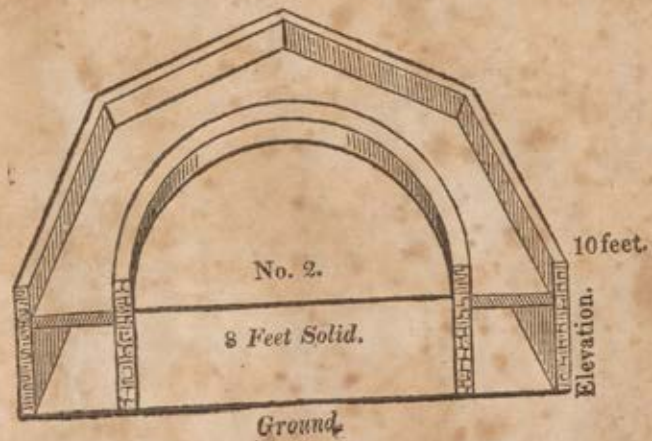
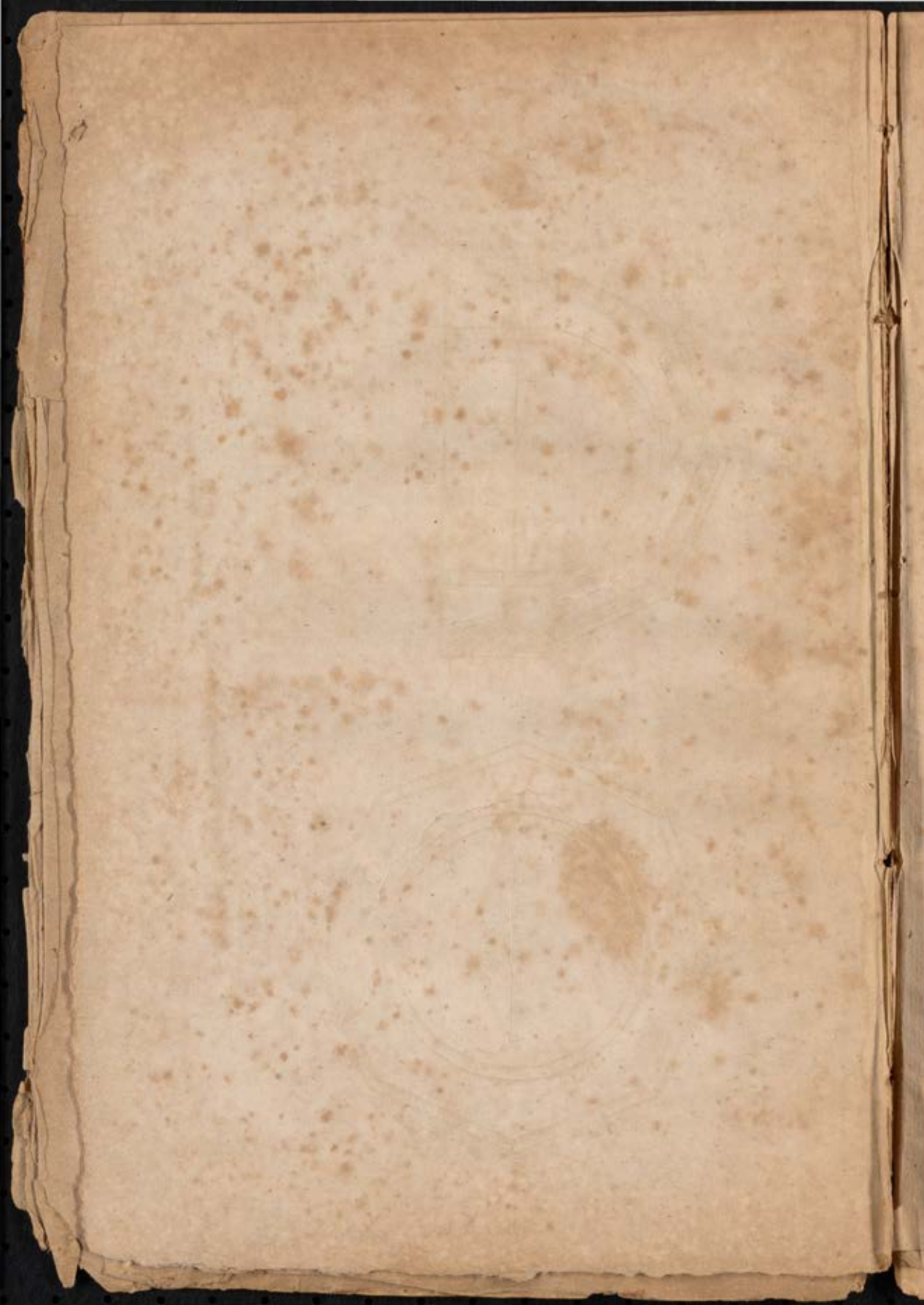


Plate No. II.

Section.







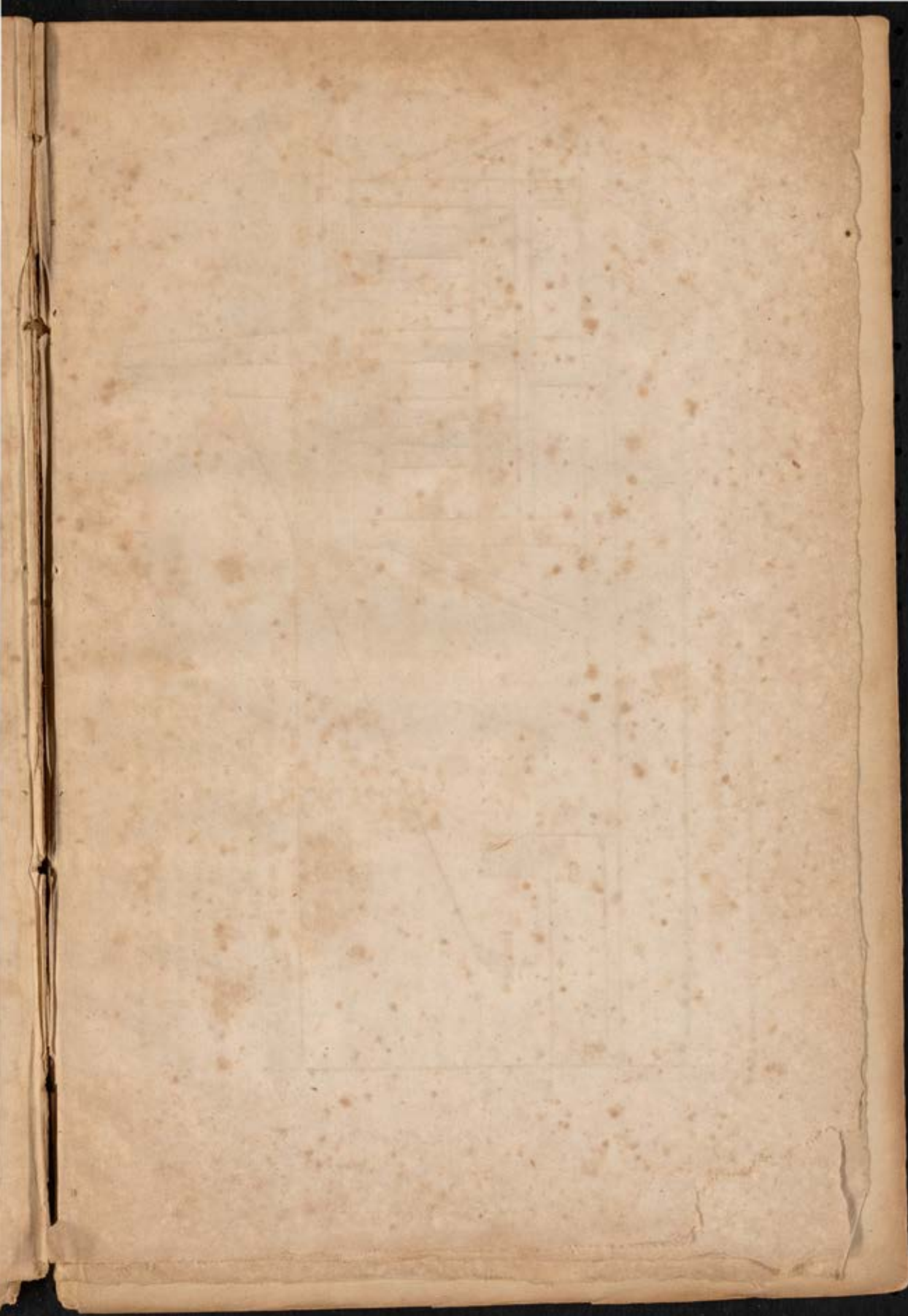





Plate No. III.

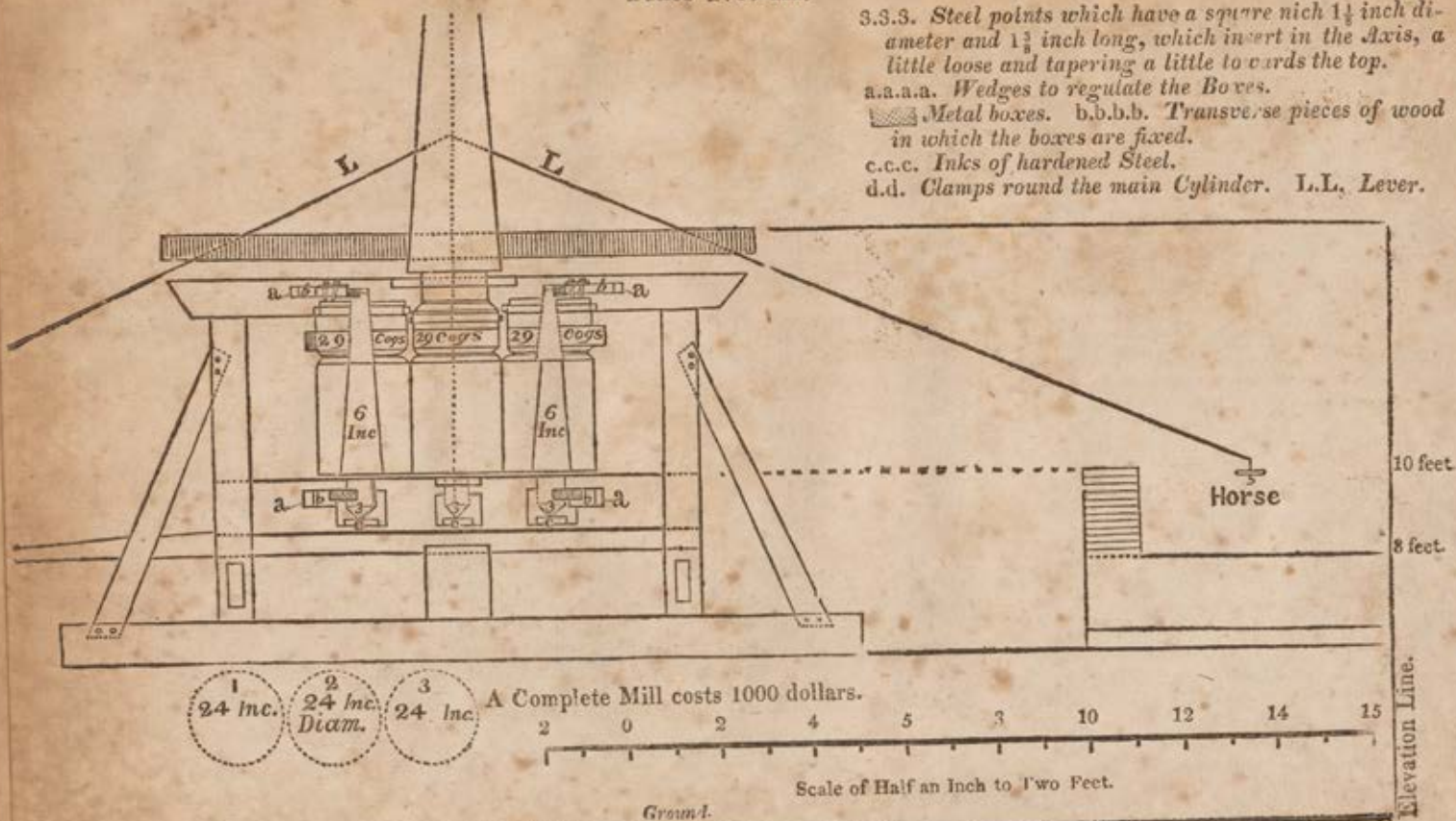
3.3.3. Steel points which have a square nich  $1\frac{1}{2}$  inch diameter and  $1\frac{3}{4}$  inch long, which insert in the Axis, a little loose and tapering a little towards the top.

a.a.a.a. Wedges to regulate the Boxes.

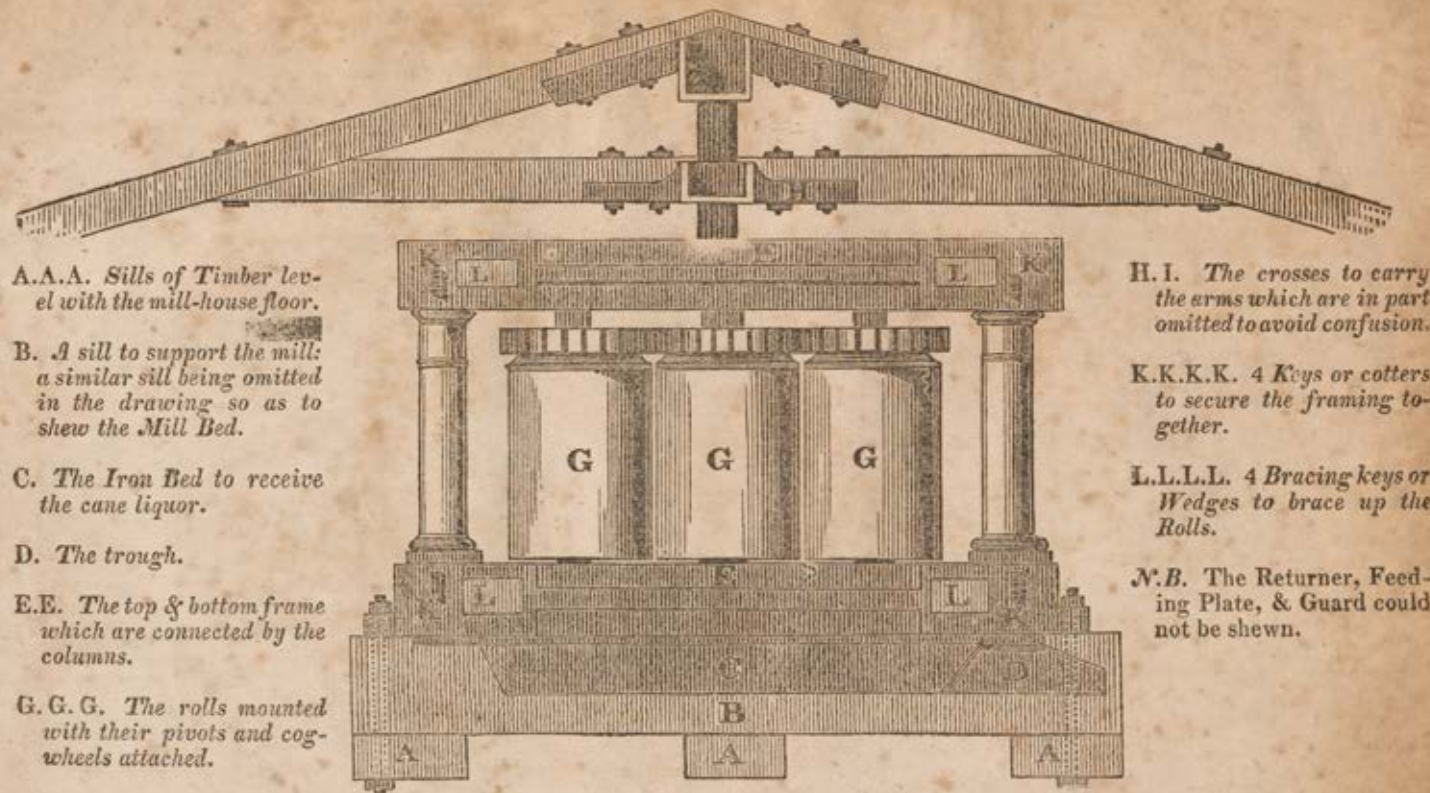
 Metal boxes. b.b.b.b. Transverse pieces of wood in which the boxes are fixed.

c.c.c. Inks of hardened Steel.

d.d. Clamps round the main Cylinder. L.L. Lever.



*Instructions for erecting an Iron Vertical Cane Mill.—Plate No. IV.*



A.A.A. Sills of Timber level with the mill-house floor.

B. A sill to support the mill: a similar sill being omitted in the drawing so as to shew the Mill Bed.

C. The Iron Bed to receive the cane liquor.

D. The trough.

E.E. The top & bottom frame which are connected by the columns.

G.G.G. The rolls mounted with their pivots and cog-wheels attached.

H.I. The crosses to carry the arms which are in part omitted to avoid confusion.

K.K.K.K. 4 Keys or cotters to secure the framing together.

L.L.L.L. 4 Bracing keys or Wedges to brace up the Rolls.

N.B. The Returner, Feeding Plate, & Guard could not be shewn.

*Elevation of a Vertical Cane Mill with Framing and Bed of Iron.*





A Complete Mill costs 1000 dollars.



Scale of Half an Inch to Two Feet.

Ground.

Elevation Lin

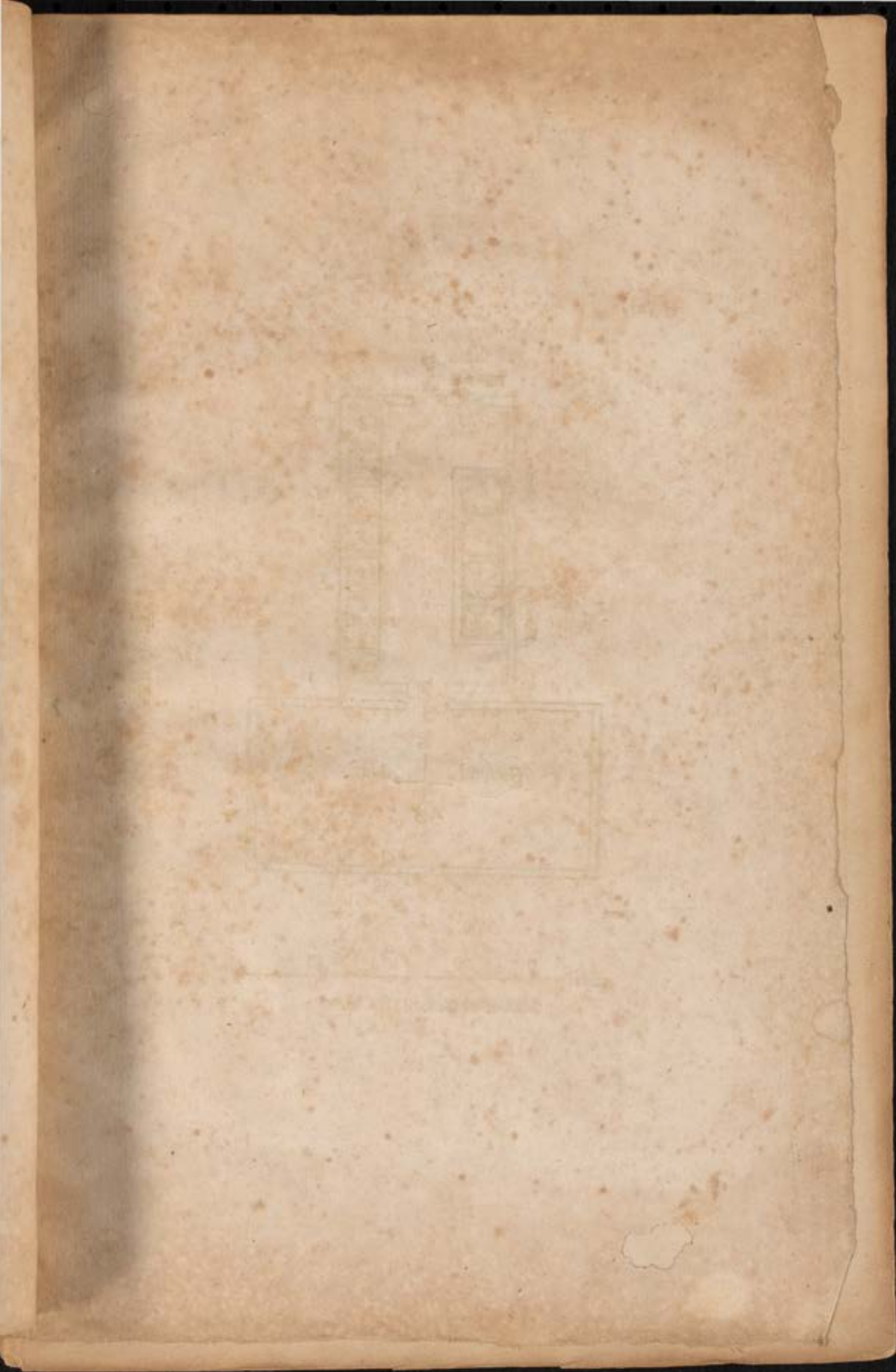




Plate No. V.

